

Medical Consequences

<i>Alcohol-Induced Liver Injury</i>	198
<i>Alcohol and the Immune System</i>	214
<i>Alcohol's Effects on the Cardiovascular System</i>	240
<i>Alcohol and Women: An Overview</i>	253
<i>Alcohol and the Skeletal System</i>	258
<i>Alcohol and Breast Cancer</i>	273

Underlying the spectrum of potential health consequences of alcohol is an array of mechanisms that encompasses not only the direct toxic harm by alcohol and its metabolites, but a variety of more complex changes. This chapter describes some of the newest insights into the nature of these mechanisms, in particular how alcohol can disrupt the normal balance of systems with which cells communicate with each other in the regulation of such functions as cell growth, muscle contraction, and the immune response. The understanding being gained is helping to explain the variety of alcohol's effects and why individuals can differ so dramatically in how they respond to the same cumulative amount of alcohol over time.

Research suggests, for example, that alcohol may alter the balance of protective and destructive responses of the immune system, particularly in the liver where most ingested alcohol is metabolized. Changes in immune regulation appear to be at the root of some of the liver damage resulting from drinking, and the inborn genetic tailoring of each individual's immune profile may help shape vulnerability to alcohol-induced damage. Similarly, research findings suggest that alcohol-related disruption of cell membrane function—and with it the ion exchange that is at the base of heart muscle contraction—contributes to heart arrhythmias. Studies also are examining the impact of alcohol on a variety of substances that shape the normal development and proliferation of cells, functions that could help to explain changes in bone mass or breast cancer risk. At the most fundamental level, there is evidence to suggest that alcohol can perturb molecular regulators of gene expression, with the potential for consequences that are both broad and lasting.

For reasons as yet largely unexplained, gender plays an influential role in vulnerability to alcohol's health effects. Three sections that follow, on alcohol and women, bone disease, and breast cancer, examine current research aimed at understanding this differential vulnerability and how alcohol could contribute to the risk of two major diseases that predominantly affect women.

Finally, the sections on heart and bone disease discuss suggestions in epidemiologic research that alcohol in no more than moderate amounts (up to one drink per day for women and two drinks per day for men) may have benefits for some groups, reducing the risk of heart disease and possibly contributing to increased bone mass, an important factor in protection from fractures. Much remains to be learned about the magnitude and mechanism of these effects and their meaning in terms of personal health.